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A Comparison of Artificial Insemination with Natural Mating in the Domestic Fowl

BY
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THERE is a substantial literature dealing with fertility obtained by the use of artificial insemination in chickens (Burrows & Quinn, 1935, Quinn & Burrows, 1936, Bonnadona, 1939, Burrows & Quinn, 1939, Parker, 1945, Reis, 1945, Mukherjee & Bhattacharya, 1949, Polge, 1951, Skaller, 1951, Gordon & Phillips, 1951) but no mention has been found of comparative tests relating to results obtained by artificial insemination versus natural mating over a lengthy breeding season.

Parker (1947) reported that hatchability in the turkey did not decline until late May and he concluded that although late season infertility may be due, in part, to the inactivity of the " toms " (stags), other factors are also involved. McCartney (1951) and Lorenz & Carson (1951) also noted that a seasonal decline in fertility in natural matings occurred in turkeys as the season advanced and reported that this decline was less marked when artificial insemination was used during the latter part of the season.

Blyth (1945), in her study of infertility and embryonic mortality in the fowl, noted that fertility decreased and embryonic mortality increased, as the season progressed. Burrows & Marsden (1938) reported that embryonic mortality was slightly higher in eggs from birds which had been artificially inseminated than from birds which had been mated naturally. Nalbandov & Card (1943) in an experiment in which the incidence of embryonic mortality was correlated with the time following the removal of the male from the breeding pen, found that stale sperm in the oviduct were a cause of increased early embryonic death. Kosin (1947) in a similar study, but using artificial insemination as the method of mating, found no evidence to indicate that the age of the sperm adversely affected hatchability in an experiment involving 1,500 eggs set. However, in a second experiment based on 500 eggs his results were more comparable with those of Nalbandov & Card.

The use of artificial insemination in progeny testing trials has been suggested by Warren & Gish (1940) and Mueller (1948), and this method of mating may well play an important part in poultry stock improvement plans. The increase in the numbers of birds now being kept in laying batteries, and the rapid development of the broiler industry in this country, have evoked considerable interest in the possible use of artificial insemination in the production

of broiler chicks from battery-kept hens. It was with these points in mind, as well as the clarification of certain points of academic interest, that this experiment was undertaken. It was hoped to obtain data relating to the expected fertility arising from the use of this technique when applied over a prolonged period and the seasonal effect, if any, on fertility and hatchability. In addition, the distribution of the embryonic mortality arising from the technique compared with that in natural mating could be investigated. The experiment reported below covers a hatching period of 300 days from November 22, 1953, to September 17, 1954.

Materials and Methods

Ninety-six cross-bred (Br. L x BR) pullets hatched April, 1953, were distributed at random in two groups of 48 birds each. One group was placed in individual cages in a commercial type laying battery. The pullets in the second group were distributed among three pens (referred hereafter as Pens 1, 2 and 3) of 16 birds each and placed in outdoor breeding units. The units consisted of solid floored houses measuring 6 by 4 feet, each house fitted with slatted floored sunporches measuring 6 by 12 feet, the tops of which were covered with " windolite " to afford protection to the birds during wet weather. Lighting in both groups was for 13 hours a day.

The males used in this study were pure bred Barred Rock cockerels in their first season. Although 13 half-brothers were selected originally so as to provide four males for use on the battery birds and six reserve males for the outdoor pens, other males had to be used on the pullets in Pen 3 owing to the high mortality caused by bullying on the part of the females. This will be discussed later. The four males which provided semen for artificial insemination were kept in outdoor individual cockerel houses, each with a slatted floor porch measuring 18 inches by 4 feet. Males held in reserve were kept in individual pens (dimensions 2 by 2 by 4 feet) in the cockerel house. In the naturally mated groups the males were placed with the pullets three weeks before the collection of hatching eggs commenced.

Males and females were fed the following breeders ration:—

	Per cent.		*Per cent.*
Ground wheat ...	15	White fish meal ...	10
Ground barley ...	17	Decor. ground nut meal	5
Sussex ground oats	15	Dried grass meal ...	5
Maize meal ...	10	Dried yeast	2·5
Middlings ...	19	Minerals	1·5

Synthetic vitamin A, D-3 and riboflavin were added at 200,000 units, 5,000 units and 113.5 mg. per hundredweight, respectively. In addition, the pullets were fed 3 oz. of oyster shell per week.

Semen was obtained from the males three times weekly by the abdominal massage technique described by Burrows & Quinn (1935) with slight modification. The semen was collected into a polythene funnel, the volume was measured and transferred into a test tube in a vacuum flask the temperature of which was 15° to 16° C. In the latter part of the experiment the semen was collected directly into a centrifuge tube by means of the collection apparatus described by Cooper (1955).

Insemination of pullets was carried out in the early part of the afternoon to ensure greatest possible fertility (Moore & Byerley, 1942, Malmstrom, 1942, Parker, 1945). The dose was 0.1 ml. undiluted semen collected immediately before insemination*. Eggs were collected, identified with the birds' number and date of lay and were then held in an egg storage rack. The eggs were set once weekly in a conventional type forced-draught incubator and were candled on the 18th day prior to transfer to the hatching compartment. All infertile eggs and dead embryos were removed, broken open and infertility and early embryonic deaths differentiated by macroscopic examination under a bright light. Embryonic mortality was divided into two periods; the first up to and including the 96th hour, and the second that occurred between the fifth and 18th days. The number of chicks dead in shell on the 21st day was also recorded.

Egg production has been calculated on a hen-day and a hen-house basis. Causes of mortality have been recorded.

Results and Discussion

Some difficulty is encountered in the design of experiments in which the fertility of battery birds is compared with a group which is naturally mated. From the standpoint of insemination, birds kept in laying batteries are far more satisfactory to handle than birds kept in pens, especially in the case of light breeds or light-heavy crosses, which are inclined to be excitable. It was for this reason that birds to be inseminated were not held in pens, since it was felt that the excitement caused by weekly catching of the birds would have an adverse effect on production. In an attempt to maintain conditions as constant as possible, outdoor birds were kept on slatted floors and sawdust litter was removed frequently from the house in order to minimise the effect of pullets having access to their droppings and avoid undue intake of extra nutrients unavailable to the battery birds. The males used for the insemination of battery birds were housed outdoors under conditions similar to those of the males which were running with the females.

The occurrence of bullying of the male by the females in a breeding pen is unusual, but in Pen 3 of the naturally mated birds this vice commenced about three and a half months after the start of the experiment when the male was removed because of a sharp drop in fertility. This male was in poor condition and subsequent *post-mortem* findings showed him to be suffering from a cystic kidney and cirrhotic liver. The male which replaced him was a strong and vigorous bird, but within three weeks he had been so bullied as to necessitate his removal. This bullying was accompanied by a sharp drop in fertility although during the first week he was in the pen fertility was at a high level (88 per cent.). Subsequent *post-mortem* examination showed the reproductive organs to be normal for a breeding male. Several males were then used in succession and although " hen-specs " were

* Inseminations once weekly.

FIG. 1(a).—Weekly fertility. Artificial insemination versus natural mating.
.- - - - -. A.I. ×———× Natural mating.

FIG. 1(b).—Weekly fertility. Artificial insemination versus Pens 1 and 2.
.- - - - -. A.I. ×———× Natural mating.

FIG. 2(a).—Incidence of early dead germs. Artificial insemination versus natural mating.
.- - - - - -. A.I. ×————× Natural mating.

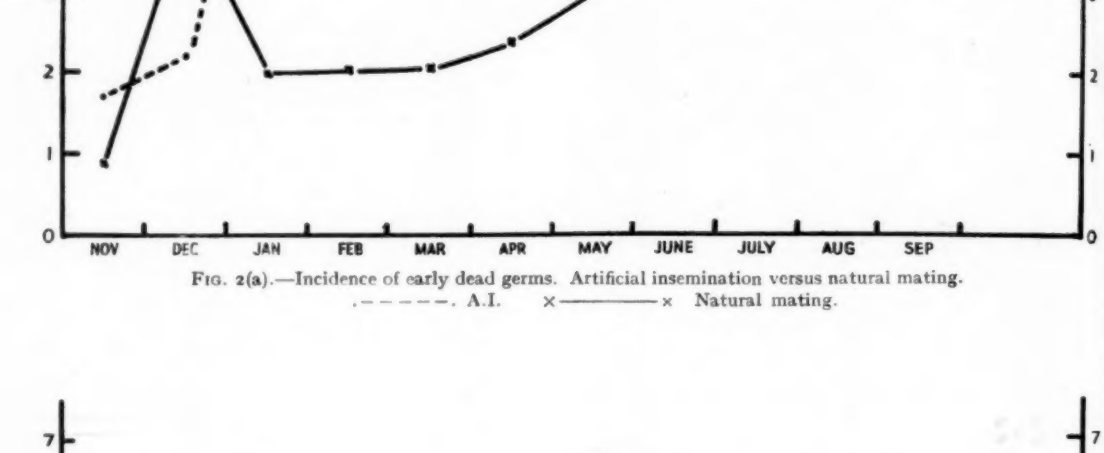

FIG. 2(*b*).—Incidence of early dead germs. Artificial insemination versus Pens 1 and 2.
.- - - - - -. A.I. ×————× Natural mating.

ted to the pullets bullying continued. In the period ndied no less than 10 males were tried on this pen, t the vice persisted. It should be noted that the nales were all fertile as evidenced by the results f mating during April. On completion of the experi- ent the surviving birds were inseminated and again und to be 100 per cent. fertile.

The results of the experiment have been analysed two methods: (1) a comparison of artificial insem- ation with the three pens of naturally mated birds d (2) by comparing artificial insemination with two ns of naturally mated birds, omitting the pen in hich the behaviour pattern outlined above had curred. Nevertheless in making a true comparison the value of artificial insemination such occurrences ust be taken into account.

Fertility

On plotting the weekly fertility in graphic form, shown in Fig. 1 (a), it will be seen that the arti- ially inseminated birds gave good fertility through- t the entire experimental period with little devia- n from the mean. The naturally mated group hree pens) showed marked fluctuations during the riod November to April, after which the usual asonal decline in fertility occurred.

This seasonal decline is evident even when the data om Pen 3 is omitted as shown in Fig. 1 (b). The rtility obtained in the early part of the season was nsiderably higher than that obtained from artifi- al insemination, nevertheless, after a peak in fer- lity in March, a gradual decline became apparent as e season progressed and from the third week in une the fertility declined at a more rapid rate until e end of the experiment. The slightly better fer- lity during the early part of the season probably sults from the frequency of natural mating, which comes less frequent as the season progresses with e consequent decline in fertility. A decline in fer- lity in the inseminated birds also occurred from the ird week in July, although a month later fertility d again reached 80 per cent. This would support e contention of Parker (1947) that factors other than equency of mating appear to be involved in the cline in fertility.

Embryonic mortality

It is of particular interest to note that the inci- nce of early embryonic mortality appears to be eater in the inseminated birds even though insem- ations were made every seven days. More frequent semination, *e.g.*, twice weekly, may reduce the mbers of early deaths, although Nalbandov & ard (1943) concluded that no increase in early em- yonic deaths occurred with sperm less than 11 days d.

An outbreak of pullet disease occurred in the turally mated pens late in November and spread a milder form to the battery birds in early Decem- r. The time lag in the outbreaks coincides with sharp increase in embryo mortality as shown in ig. 2 (a) (b). Although no reference could be found the literature to embryonic mortality in outbreaks f pullet disease, it appears from the results reported erein that the disease may cause a significant in- rease in early embryo mortality.

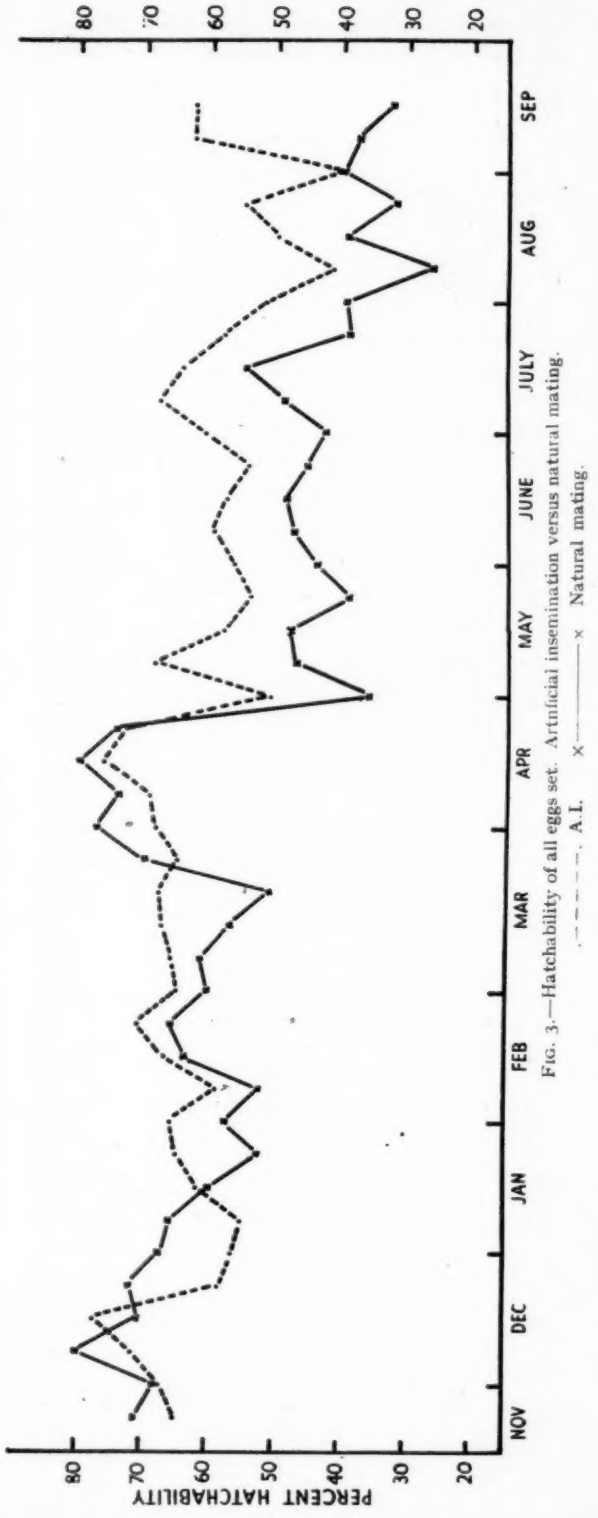

FIG. 3.—Hatchability of all eggs set. Artificial insemination versus natural mating.
- - - - -, A.I. ×————× Natural mating.

TABLE I
SUMMARY OF THE COMPARISON OF ARTIFICIALLY INSEMINATED WITH NATURALLY MATED BIRDS

	Nov. to Mar.		Apr. to June		July to Sept.		Nov. to Sept.	
	18 weeks		13 weeks		12 weeks		300 days	
	A.I.	Natural	A.I.	Natural	A.I.	Natural	A.I.	Natural
Number of eggs set	3,489	3,496	1,796	2,415	1,391	1,404	6,676	7,315
„ infertile	608	800	252	507	247	632	1,107	1,939
„ E.D.G.	141	83	105	76	73	45	319	204
„ D.I.S.	470	380	317	190	274	162	1,061	1,032
„ chicks hatched	2,280	2,223	1,116	1,334	780	569	4,176	4,126
Per cent. fertile	82·6	77·1	86·0	79·0	82·2	55·0	83·4	73·4
„ E.D.G.	4·0	2·4	5·8	3·1	5·3	3·2	4·8	2·8
„ D.I.S.	13·5	10·9	18·1	20·3	17·6	11·5	15·9	14·1
„ hatch—fertiles	79·1	83·2	72·2	69·9	68·2	73·7	74·9	76·7
„ „ —all eggs set ...	65·3	63·6	62·1	55·2	56·1	40·5	62·5	56·4

During May incubation had to be carried out in a different machine and results were most unsatisfactory. It had been hoped to note the increase, if any, in the numbers of chicks dead in shell, and if so, at what time, but such comparisons as were made had to be discarded in view of the unsatisfactory hatching results. Regardless of the method of mating there was, however, some increase in the number of chicks dead in shell as the season progressed.

3. *Hatchability*

In considering the hatchability of all eggs set, it seems that under the particular conditions of the experiment there is a significant difference in favour of the inseminated birds from May until September (Fig. 3). If the experimental period is broken into three periods, November to March (18 weeks), April to June (13 weeks), and July to September (12 weeks) there is no significant difference in hatchability of all eggs set between artificial insemination and natural mating for the first and second period, but a highly significant difference ($P = <.01$) in favour of artificial insemination during the third period (Table I). The difference in hatchability during the second period of 6.7 per cent. in favour of the inseminated birds though not statistically significant is, nevertheless, of economic importance to the hatcheryman.

4. *Egg Production and Mortality*

Egg production has been calculated on a hen-day basis and is shown below:—

	Nov.–Mar. *Per cent.*	*Apr.–June* *Per cent.*	*July–Sept.* *Per cent.*
A.I.	66·7	54·9	54·0
Natural mating ...	64·2	67·6	48·4

The average production as based on a hen-housed average was 159 eggs for the battery-held birds and 166 eggs for the outdoor birds during a 44-week period.

Mortality in both groups was rather high although deaths were not confined to any particular period in the experiment. Details of *post-mortem* examination are as follows:—

Artificially Inseminated 35·3 *per cent.*		*Naturally Mated* 31·2 *per cent.*	
Neurolymphomatosis ...	5	Neurolymphomatosis ...	1
Visceral lymphomatosis	5	Visceral lymphomatosis ...	3
Internal laying and peritonitis	2	Egg peritonitis	3
Haematoma	1	Prolapse	1
Prolapse	1	Fatty infiltration of the liver	1
Fatty infiltration of the liver	1	Gout	1
		Typhilitis	1
		Abscess in body cavity ...	1
		Leg injury	1
		Cannibalism	2

From the practical point of view, the time taken in handling males and inseminating females should also be taken into consideration in evaluating artificial insemination as a method of breeding. In the opinion of the author, semen should be collected from the males at regular intervals to obtain satisfactory volumes of semen, and for practical purposes the females to be inseminated should be separated into three groups so that one group may be inseminated each time semen is collected. The alternative is to inseminate all the females at one time but this would require a greater number of males, while the operation of obtaining semen on the other days is still necessary. Two experienced operators can undertake the collection of semen at the rate of about one minute per male allowing for its removal from and to the pen. The operators can inseminate about 100 to 120 per hour when hens are kept in conventional laying cages with fixed front water troughs and removable feed hopper. If a third person is available the operators can handle the insemination of hens as fast as they can be taken out of the cages.

Summary

1. A comparative test of artificial insemination versus natural mating was carried out over a hatching period of 300 days from November 22, 1953, to September 17, 1954.

2. Fertility in the inseminated pens averaged 82.6 per cent. for the period November to March; 86 per cent. for the period April to June and 82.2 per cent. for the period July to September. Overall fertility for the period November to September was 83.4 per

cent. Statistical analysis revealed a highly significant gain over the naturally mated group for the 300-day experimental period (P=<.01).

3. Fertility for three pens of naturally mated birds was 77.1 per cent., 79 per cent. and 55 per cent. for the three periods respectively. Overall fertility for the period November to September was 73.4 per cent. When data from one pen was removed (due to bullying of the male by the females) the figures are 92.4 per cent., 85.1 per cent., and 72.2 per cent. Overall fertility was 86.3 per cent.

4. Early embryonic mortality (*i.e.*, up to 96 hours) was 2 per cent. greater in the inseminated birds but there did not appear to be significant differences in the incidence of dead in shell chicks. Both early embryonic mortality and dead in shell chicks increased as the season progressed.

5. Hatchability of all eggs set was in favour of the inseminated birds throughout almost all the experimental period and significantly so from the period of May 1st onwards.

6. There were no significant differences in egg production between the inseminated and naturally mated birds. The average production on a hen-housed basis was 159 eggs for the battery held birds and 166 eggs for the outdoor birds for a 44-week period. Mortality was 35.4 per cent. in the inseminated birds and 31.2 per cent. in the naturally mated birds, neural and visceral lymphomatosis being the greatest single cause of death in both groups. One case of prolapse occurred in each group.

7. Bullying of males by the females occurred in one pen of naturally mated birds. No fewer than 10 males were tried on this pen during the experimental period. The fitting of "hen-specs" made no difference to the behaviour of the females.

Acknowledgments—I should like to express my appreciation to Lord Rothschild and to Dr. R. F. Gordon for their interest in this experiment; to Mr. C. G. Stacey for incubation of the eggs; and to Miss P. Reynolds for her invaluable technical assistance throughout the course of the experiment.

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Lapinised Rinderpest Vaccine: Post-inoculation Reactions in High-grade Guernsey Cattle

BY
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IN Kenya, lapinised rinderpest vaccine is used to protect European pedigree cattle and their crosses, and every batch is tested in similar animals, and in rabbits, before issue. Post-inoculation reactions have been notable by their rarity and, therefore, the unexpected sequelae, recorded in this paper, emphasise the inherent risk associated with live virus vaccines.

A herd of pedigree, high grade Guernsey cattle had been inoculated annually with inactivated bovine spleen tissue vaccine. In July, 1954, the 145 cattle were vaccinated with lapinised rinderpest virus. The cattle included 47 previously unvaccinated animals which were under 18 months of age. On the ninth day after inoculation (p.i.), the first reactions were noticed and, by the 11th to 12th days p.i., three ten-month-old pedigree bulls and 44 high grade heifers were sick. Only the previously unvaccinated cattle reacted. The average duration of the reaction was six days. There were no deaths but all the reacting animals lost condition. In the same month 11,000 doses of lapinised vaccine, including ampoules of the same batch, were used in the same district without incident.

Clinical Findings

The reacting cattle exhibited anorexia and pyrexia with rectal temperatures of up to 106° F. Diarrhoea was profuse, with small flecks of blood in the foul-smelling faeces. Small raw ulcers developed on the buccal mucosa, under the tongue, on the pillars of the soft palate and in the pharynx. A slight purulent discharge was associated with a conjunctivitis. Lachrymation was marked.

Laboratory Findings

Rabbits, goats, and rinderpest-susceptible cattle were inoculated respectively with 1.0, 2.0, and 150.0 ml. citrated blood taken during the reactions. Viable virus was not demonstrated in any of the inoculated species. The rabbits neither reacted nor developed the characteristic lesions of lapinised rinderpest virus. The goats maintained normal temperatures and were susceptible on challenge with goat-adapted rinderpest virus. Similarly, the cattle did not react, but were found to be immune when

challenged with 10,000 ID_{50}s of virulent virus. The rabbit and goat findings suggested that the cattle immunity was passively acquired.

Discussion

The lapinised rinderpest virus strains used for prophylactic immunisation, have been serially passaged in rabbits 700 to 800 times and are believed to be "fixed" in virulence (Nakamura, Fukusho, & Kuroda, 1943) although Brotherston (1951) found a decreased virulence for rabbits and an irregular but increased virulence for cattle after several alternate passages between cattle and rabbits. Post-inoculation temperature reactions in cattle are an index of the susceptibility of the cattle to rinderpest and not of the virulence of the virus. The susceptibility is also influenced by the age of the cattle and, in China, various workers (Kwong & Lee, 1947; Alton, 1950; Watson, 1950, 1951) observed a higher incidence of reactions in calves up to six months of age than in adult cattle. In East Africa the following types of cattle can be described in descending order of natural resistance to rinderpest: East African Shorthorned Zebu, Zebu-European crosses, Zebu-Sanga crosses, Europeans, and Sanga. Green (1950) noted reactions in vaccinated Sanga cattle. Kwong & Lee (1943) recorded mild reactions in European dairy cattle and they noted that most reactions were among the Jersey cattle. The Veterinary Research Laboratory, Kabete, has issued 2,000,000 doses of lapinised rinderpest vaccine and more than 300,000 grade, high grade and pedigree European cattle have been vaccinated. Post-inoculation reactions were rare, the reported incidence rate in Kenya being approximately 0.03 per cent. The incidence, recorded in this paper, was 32 per cent. for the herd and 100 per cent. in the previously unvaccinated cattle. A satisfactory explanation as to why the cattle in this herd were so susceptible cannot be given. All the cattle were young (6 to 18 months) and all had a high percentage of Channel Island blood but additional factors must be involved, for many herds of grade and pedigree Guernsey cattle have been similarly vaccinated without incidence.

Natural rinderpest was ruled out because the nearest focus of infection was at Mosiro, 80 miles away in the centre of Masailand. In addition, if the cattle had been infected with rinderpest before or within 72 hours after inoculation the course of the disease would not have been influenced by the inoculations and deaths would have been expected. Infection at a later period after inoculation would have been aborted by the interference phenomenon (Brotherston, 1951).

Summary

Unexpected post-inoculation reactions in young Guernsey cattle vaccinated with lapinised rinderpest virus are described and discussed.

Acknowledgments.—This paper is published by the kind permission of the Director of Veterinary Services, Kenya, and the Director of the East African Veterinary Research Organisation.

THE J. T. EDWARDS MEMORIAL FUND

The President and members of the South Wales Veterinary Association have pleasure in submitting the second list of donations to the Dr.'s James Thomas Edwards Memorial Fund. Donations are still coming in and further lists will be published.

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A Method of Treatment for Bulls Infected with *Vibrio foetus*

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Introduction

THERE have been several reports on various methods of treatment for bulls infected with *Vibrio foetus* (Lofthouse, 1951, Terpstra & Eisma, 1951, Powley, 1952). The British workers used penicillin parenterally while the Netherlands team used penicillin in an oil base as a topical dressing to the penis and associated areas. These reports were encouraging.

In 1951 the method of treatment to be described was devised. It was based on the fact that the organism is sensitive *in vitro* to penicillin and streptomycin (Prier, 1951, Terpstra & Eisma, 1951, Plastridge & Easterbrooks, 1952), and on the generally accepted view that, in the bull, *Vibrio foetus* infection is confined to the lining of the prepuce and to the glans penis. For these reasons the method chosen was the application of both penicillin and streptomycin to the glans penis, the terminal portion of the urethra and the preputial lining. The antibiotics were dispensed in the form of a non-irritant, readily diffusible emulsion which was applied locally to produce a maximum concentration of the active agents at the site of infection.

There has been one report that the site of *Vibrio foetus* in the bull is not so localised (Rasbech, 1952). This report has not yet been confirmed, but it has stimulated the authors to investigate the effects of antibiotics administered parenterally, and it is hoped that a report on this work will be presented later. The present communication is intended to describe the technique and efficiency of the local treatment of the disease, following a limited experience of this procedure. It is presented now so that veterinary surgeons in practice may be informed and have the opportunity to apply the method, one which can be used readily on the farm.

Procedure

Bulls were considered suitable for the experimental treatment provided they satisfied the following conditions:—

1. They came from attested herds.

2. There was irrefutable evidence that they were infected with *Vibrio foetus*, that is:—

(a) there was a suspicious herd history, which had been confirmed by

(b) laboratory tests on samples submitted from animals served by the bull. These tests were the cultural examination of aborted foetuses and/or the examination of vaginal mucus samples by the agglutination test.

3. The owner agreed to test-mate the bull after treatment with a group of preferably more than six virgin heifers.

The bulls were then transported to the Wellcome Veterinary Research Station and a sample of semen collected artificially for laboratory examination.

The antibiotic suspension was dispensed so that one bottle contained the following:—

Procaine benzylpenicillin	750,000 I.U.
Potassium benzylpenicillin	250,000 I.U.
Dihydrostreptomycin sulphate (700 I.U. per mg.)	1 g.
Arachis oil	50 c.c.
Suspending agent	q.s.

Daily applications were made for five successive days.

On the first day relaxation of the retractor penis muscle was necessary and, to obtain this, epidural anaesthesia was employed in preference to general anaesthesia to reduce the operative risk to a minimum. The degree of anaesthesia required was reached when the penis could be extracted from the sheath, but the bull retained sufficient motor control of the hind limbs to remain standing. For this purpose an average young Ayrshire bull weighing about 1,200 lbs. was given 10 c.c. of a 5 per cent. procaine solution without adrenalin and as a rule it was necessary to wait 15 to 20 minutes before the penis could be extracted. If after this time the penis was not sufficiently relaxed a further small dose (2 to 3 c.c.) of the anaesthetic was given. During this period the hairs around the preputial orifice were removed by closely clipping with a pair of dressing scissors and the area for a radius of some two feet around the orifice was thoroughly washed with soap and water containing a mild antiseptic, rinsed with water and dried. The treatment was carried out with the bull standing on clean oat straw, because gross contamination of the penis would have occurred if the animal had gone down on sand or sawdust. When sufficient relaxation of the retractor penis muscle had been attained the penis was to be found lying immediately within the preputial orifice. The body of the penis was held through the prepuce with one hand and the skin drawn back from the orifice with the other. Three or four inches of the penis were thus exposed and to this an assistant firmly tied a bandage so that the extrusion could be completed and maintained. The contents of one bottle of the suspension had meanwhile been emulsified by adding 50 c.c. of sterile distilled water and shaking.

The operator, protected by rubber gloves, thoroughly massaged this emulsion into the glans penis and sheath. The posterior preputial folds including the area in some bulls accessible only to the tips of the fingers were first irrigated with about 20 c.c. of the emulsion using a teat syphon attached to a syringe. The more accessible parts of the penis were then dressed and about 20 c.c. of the emulsion were injected via the processus urethri into the uretha by means of a teat syphon. The penis was then returned to the sheath and the orifice grasped

with the hand whilst the sheath was massaged along its length. A small volume of the emulsion was also massaged into the skin around the preputial orifice. A clean bandage was then tied immediately behind the orifice to maintain the penis in the sheath, to prevent its damage and contamination and to ensure retention of the emulsion. The bull was then bedded down on clean straw in a box which had been washed out and disinfected. The bandage around the prepuce was removed as soon as the bull had regained sufficient control to retain the penis in the sheath.

Daily from the second to the fifth day of treatment a uterine catheter was introduced as far as possible into the prepuce and the preputial orifice was occluded by the hand. Fifty c.c. of the emulsion, prepared as described above, were injected and the catheter withdrawn, the occlusion of the orifice being maintained. The sheath was then thoroughly massaged for five minutes. Epidural anaesthesia was not necessary during these dressings but the bedding was changed and the box disinfected daily. The instruments required were sterilised before use.

The bull was then returned to the owner to be test-mated with a group of preferably more than six virgin heifers. It was not used for natural service or for the artificial collection of semen for two weeks after treatment. This was because of the possibility of irritation to the penis by the growing preputial hairs and to the fact that some heifers will refuse service by a bull so clipped. Accurate service records were made and, whenever possible, vaginal mucus samples were collected from the test-mated heifers approximately three months after they had been served. These mucus samples were submitted to the Veterinary Laboratory, Weybridge, for examination by means of the agglutination test for *Vibrio foetus* infection. Pregnancies were confirmed by rectal palpation.

Providing the test-mating was satisfactory the bull was allowed to serve naturally those animals on the farm which were known not to be infected (and in most cases this limited natural service to virgin animals). If required, semen was collected artificially, using a non-infected animal animal as the "teaser," for the insemination of infected and possibly infected cows. The danger of re-infection was great if an infected animal had been used as a "teaser" for there might have been contact of the penis or preputial orifice with the vulva and accidental mating might have occurred, particularly with rough, keen bulls. However, in one herd infected cows had to be used as "teasers" and in this case the external genitalia, tail and tail-head of the cows were washed with antiseptic solution before collection.

Results

The methods used for the diagnosis of *Vibrio foetus* infection and the results of test-mating the bulls after treatment are shown in Tables I and II respectively.

It will be seen that, in all cases, the clinical suspicion that the bulls were infected had been confirmed by one or both of the suitable diagnostic laboratory tests and that with one exception the test-mating results were satisfactory after treatment. In no case was any evidence of *Vibrio foetus* found.

TABLE I

DETAILS OF BULLS TREATED AND EVIDENCE OF INFECTION WITH *Vibrio foetus*

Identification of bull	Breed	Suspicious herd history	Isolation of organism from herd samples	Agglutination tests on vaginal mucus samples
1	Friesian	+	+	Not done
2	Ayrshire	+	+	+
3	"	+	+	+
4	Shorthorn	+	Not done	+
5	Ayrshire	+	"	+
6	"	+	+	Not done
7	Hereford	+	Not done	+
8	Friesian	+	+	+
9	Jersey	+	+	Not done
10	Aberdeen Angus	+	+	+
11	Ayrshire	+	Not done	+
12	"	+	+	+
13	"	+	+	+
14	Friesian	+	Not done	+

TABLE II

RESULTS OF TEST-MATING THE BULLS, AFTER TREATMENT, WITH VIRGIN HEIFERS

Identification of bull	Number of heifers mated	Number pregnant to first service	Average number of services per pregnancy	Agglutination tests on vaginal mucus samples
1	6*	5	1·2	Not done
2	10	9	1·1	Negative
3	4	3	1·3	"
4	7	6	1·1	"
5	6	5	1·2	"
6	10†	8	1·2	"
7	6	5	1·2	"
8	5	4	1·2	"
9	9	7	1·2	" [1]
10	6	5	1·2	"
11	7	7	1·0	"
12	5	1	?c	"
13	5	5	1·0	"
14	7	5	?d	" [2]

* Includes one cow believed not to have been exposed to infection.

† Sufficient virgin heifers not available. First-calf heifers believed not to have been exposed to infection therefore used.

a Heifer which returned not served again.

b Heifer which returned had vaginal abscess and was not served again.

c Repeat services were not by same bull.

d Second services not yet made.

[1] Four samples only submitted.

[2] One sample, from a heifer pregnant to her first service, collected c. seven weeks after service was suspicious. Repeat samples from this heifer collected c. 12 and 15 weeks after service were negative.

Discussion

Several observers of the application of the technique described have commented on the small dose of local anaesthetic used to produce a satisfactory relaxation of the penis. However, the Shorthorn bull No. 4 lost motor control of the hind limbs and became recumbent for two hours, half an hour after 11 c.c. of anaesthetic had been given. It was therefore decided to adopt a low initial dose to be supplemented

as necessary. This method has given excellent results except in the case of the very fat bull, No. 10, for which a total of 24 c.c. was required. It is believed, however, that the first dose was not in fact injected into the epidural space of this bull.

At the beginning of the experiment it was thought that some further mechanical aid would be helpful in withdrawing the penis from the sheath. Through the courtesy of Dr. J. I. Terpstra a bull "cone" designed at the State Serum Institute, Rotterdam, was used in an adapted form. To a metal cone was attached a rubber sleeve which was lubricated and introduced into the prepuce. The tip of the relaxed penis was manipulated into the sleeve and both were withdrawn by applying a negative pressure of 12 inches of mercury, obtained by using an electric suction pump. As more experience was gained, however, in assessing the degree of epidural anaesthesia required, it was not found necessary to use this cone.

There is one bull in these observations to which special reference must be made. This is the Ayrshire bull No. 2 which some time after being test-mated and proved free from infection, became vicious and injured an attendant. The value of the bull was so great that the owner decided that, before disposal, it should be used on as many cattle as possible on the farm including infected animals. Following a change in its management it became more tractable. The owner therefore decided to retain the bull and a request was made to re-treat it so that once again it could be used on virgin heifers to help build up a clean herd. This was done. Test-mating was again carried out and the results are given in Table II—bull No. 12. It will be seen that the conception rate of the heifers was not good, but that their vaginal mucus samples were negative to the agglutination test for *Vibrio foetus* infection. It is of interest that the heifers which this bull had previously served (Table II, bull No. 2) and those served by other bulls from the same farm (Table II, bulls No. 3 and 13) had been reared and kept on the home farm. Those served by the bull after his second treatment were reared and kept on an outlying farm and were sent for service to the home farm where the bull was standing. The standards of management and co-operation on the outlying farm were poor. Indeed, the one test heifer which proved to have been in calf to the test-mating was accidentally aborted by artificially inseminating her during pregnancy. This problem is being investigated but there is no evidence that it is due to *Vibrio foetus* infection.

Further reference must also be made to one of the test heifers served by bull No. 10. This animal aborted when seven months in calf. The foetus was examined at a Veterinary Investigation Centre of the Ministry of Agriculture and Fisheries and *Brucella abortus* was isolated. Two other cows in this herd, but not served by this bull, also aborted about the same time. From these foetuses also, *Brucella abortus* was isolated.

Summary

A technique for treating bulls infested with *Vibrio foetus* is described.

Fourteen bulls from 11 herds were treated by the topical application of a penicillin/streptomycin emulsion to the penis and sheath.

As judged by test-mating with virgin heifers this treatment was successful.

Acknowledgments.—The authors wish to thank Dr. R. F. Montgomerie and Mr. S. L. Hignett for their encouragement and advice throughout the experiment; The Distillers Company (Biochemicals) Ltd. for presenting the antibiotics; Mr. J. R. Lawson of the Ministry of Agriculture Veterinary Laboratory, Weybridge, for his assistance in the examination of samples; and the veterinary surgeons who collaborated in the trials.

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THE REGISTER OF VETERINARY SURGEONS

Under Section 25 (3) of the Veterinary Surgeons Act, 1948, and the provisions of Statutory Instrument No. 1150 of 1953, the names of the following have been removed from the Register of Veterinary Surgeons. The addresses given are the last registered address in each case:—

David, V., c/o 12, Barn Way, Wembley Park, Middx.; Fitzsimons, J. J., 23, Fitzwilliam Square, Dublin; Flannery, R. W., 5, Maypark, Malahide Road, Dublin; Kaluski, W. J., 8, Mellor Road, Prenton, Birkenhead, Cheshire; Lyons, A. R., No. 2, The Vicarage, St. Michaels, Sittingbourne, Kent; McCloghry, J. P., Riverstown, Co. Sligo, Eire; McGeoch, D., 11, Greenlaw Avenue, Paisley; Masterson, J. J., Antfield House, Dromod, Leitrim, Eire; O'Neill, O. A., c/o Ross & Co., Mullingar, Eire; Orr, W. C. L., 17, Prince Albert Road, Regent's Park, London, N.W.1; Richardson, J. Elton Lodge, Rossduff, Waterford, Eire; Sexton, M. A., c/o Post Office, College Green, Dublin; Slavin, D., 15, Gartferry Street, Balornock, Glasgow, N.; Timoney, T. M., c/o M. J. Timoney, 9, Lower Dorset Street, Dublin.

The following names have been removed from the Supplementary Veterinary Register:—

Brown, L. C. G., c/o 15, Douglas Road, Hounslow, Middx.; Hodgson, D. M., 26, Hall Street, St. Helens, Lancs; Murch, C. T., Dunridge, Springfield Road, Plymstock, Devon; Romney, Mrs. L. F., 131, Wyong Road, Bentley Park, Perth, W. Australia; Thompson, A., 91, London Road, Dover, Kent; Waddell, B. C. F., 16, John Street, Shoreham-by-Sea, Sussex.

CRYPTORCHIDISM IN THE DOG

The following is a copy of a statement drawn up at the request of the Kennel Club after discussions between representatives of the Club and of the Technical Development acting on behalf of Council, B.V.A. The statement will also be published in the June issue of *The Kennel Gazette*.

Readers will note that the material is prepared in a form suitable for lay readers; attention is drawn to an article on this subject which was published in THE VETERINARY RECORD of August 21st, 1954, p. 482.

The British Veterinary Association has received from its members reports that the incidence of cryptorchidism in dogs is increasing. Cryptorchidism, which constitutes an abnormality, is accepted by the veterinary profession as being usually a hereditary defect. The increasing occurrence of the condition is best explained by considering it to be due to a recessive factor. It is proposed to explain, firstly, what is usually understood by the term "cryptorchidism" and, secondly, what practical methods of elimination can best be used against a defect which is hereditary and due to a recessive factor.

Cryptorchidism

In the embryo, the testicles develop in the abdominal cavity near the kidney, and to reach their proper final position in the scrotum they have to pass from their original position through the abdominal wall by way of the inguinal canal to the scrotum. In many domestic animals, the descent of the testicles into the scrotum is generally completed by the time of birth, but in the dog this is not always the case, as in some dogs the testicles do not descend completely until a week or so after birth.

Cryptorchidism is a developmental defect characterised by the failure of one testicle (unilateral cryptorchidism) or of both testicles (bilateral cryptorchidism) to descend to their normal position in the scrotum. According to the position reached by the testicle, the organ may be abdominal, inguinal, or subcutaneous in position. Abdominal cryptorchidism may be (i) complete, if all the testicle and its appendages are in the abdomen, or (ii) incomplete, if part of the appendages are in the inguinal canal.

The term monorchidism is used colloquially to denote the presence of only one testicle in the scrotum, but strictly speaking it should be used to indicate the condition where only one testicle is present in the animal. A dog with only one testicle in the scrotum is usually in fact a unilateral cryptorchid and not a true monorchid. In some instances, the incompletely descended testicle or testicles have passed from the abdominal cavity through the inguinal canal but do not reach the scrotum, and lie under the skin between the scrotum and the inguinal canal. It is considered that all these conditions, whether unilateral or bilateral, of failure to reach the scrotal position are varying degrees of one and the same defect. Although they are usually included in the term "cryptorchidism" the word actually means "hidden testicle," and it would be preferable to use the term "ectopic testicle" to denote the condition under consideration, the word "ectopic" meaning merely "out of place."

The actual incidence of cryptorchidism in dogs is not known, but it is now being observed so regularly in a considerable number of breeds that it has given rise to anxiety in respect of future possible detrimental effects on the breeds concerned. While a cryptorchid dog (that is, a dog with one or both testicles ectopic) may appear normal apart from the defect, there are reports of the condition affecting the general health or disposition of the animal, common symptoms being unreliable character, psychical disturbance, nervousness, increased fat deposition, eunuch-like characteristics, and so one. One notable feature appears to be a tendency for some ectopic testicles to become the site of neoplasm (tumour) formation. These tumours sometimes spread to produce secondary growths and in any case even when they remain localised they may be accompanied by a hormonal upset, in which the dog becomes feminised; the symptoms are of an unpleasant nature, and include a change in the dog so that it becomes attractive to other male dogs, and develops patches of local baldness, enlarged teats, small penis, pendulous prepuce, and diminished sexual desire.

The testicles appear to require the slightly lowered temperature provided by their position in the scrotum to maintain proper sperm production. When retained in the abdomen, the testicle is useless as a source of sperms. This explains why bilateral abdominal cryptorchid dogs are sterile but unilateral abdominal cryptorchids (with one testicle only in the scrotum) are not as such sterile.

Hereditary Incidence

There are observations indicating that cryptorchidism tends to occur with particular frequency in certain families. Special studies have been made of cryptorchids in a breed in Germany: breeders' records were examined for information as to the possible mode of inheritance of the observed cryptorchidism and expert opinion was that the evidence pointed to a recessive factor being concerned. This is also the generally accepted view of cryptorchidism here and is in line with observations on cryptorchidism in other species than the dog (pig and goat).

To understand what is meant by a "recessive factor" it is necessary first to consider some genetical principles and then to discuss their practical implications. Stated simply, we may say that each character of a hereditary nature shown by an animal is dependent on the presence in its chromosomes of one or more pairs of hereditarily transmitted factors called genes; of each pair, one gene is acquired from its sire and one from its dam. Genes are said to be either

dominant or recessive. Unless its expression is prevented by some other gene, a dominant gene will cause the character to appear even when only one gene of the particular pair concerned is of this kind. A recessive gene on the other hand will only cause the visible appearance of the character concerned when both genes of the pair are of this kind. When only one of the genes is of the recessive kind, its effect will be prevented by the other gene of the pair. However—and this point is crucial—the animal with one recessive factor for cryptorchidism in a pair of genes is not genetically normal. Such an animal is called a "carrier" of the particular gene, and can pass it on to its offspring.

The combinations shown in the following table represent those possible at mating, and the offspring of such matings will theoretically bear the recessive factor in the ratios indicated.

TABLE

SHOWING THE POSSIBLE COMBINATIONS PRODUCED AT MATING BY NORMAL, CARRIER OR AFFECTED ANIMALS IN THE CASE OF A SIMPLE RECESSIVE HEREDITARY FACTOR.

Parents	Offspring		
	Normal	Carrier	Abnormal
Normal X Normal			
Normal X Carrier			
Carrier X Carrier			
Normal X Abnormal			
Carrier X Abnormal			
Abnormal X Abnormal			

The animal that is visibly normal and genetically normal with respect to a particular character may be represented thus:—

The animal that is visibly abnormal, and has a "double dose" of the recessive factor, may be represented thus:—

The animal that is visibly normal, but is a carrier of the recessive factor, may be represented thus:—

If it is agreed that cryptorchidism is due to a hereditary recessive factor, then the following conclusions may be drawn:

1. A cryptorchid dog will not be produced by mating two visibly and genetically normal dogs.

2. A cryptorchid will not be produced if a visibly and genetically normal dog is mated with a visibly normal but genetically abnormal dog (carrier), although half the offspring will in turn be carriers.

3. If a dog is a cryptorchid, it follows that its parents were

(i) both carriers;

or

(ii) one was a carrier, and the other was either a unilateral cryptorchid dog, or a bitch with a "double dose" of the recessive factor. It is considered possible that the gene may not be entirely harmless in the female;

or

(iii) both parents carried a "double dose" of the abnormality.

4. If a fertile cryptorchid (bilateral abdominal cryptorchids being sterile) is mated with a truly normal bitch, it cannot sire cryptorchid pups, but all the pups will be carriers.

5. The detection of a carrier female would involve mating it (incidentally or by intention) with a fertile cryptorchid dog.

It is clear that the condition of cryptorchidism would not be eliminated by simply discarding known cryptorchids as stud animals, but this should help to reduce the number of carriers, since known cryptorchids will produce either cryptorchids or carriers. The most thorough method of reducing the incidence of the condition is not to use the following animals for breeding:

(i) the known cryptorchid;
(ii) its litter mates;
(iii) its parents;
(iv) its offspring.

Even this degree of stringency will not completely eliminate the defect; visibly normal carriers could be produced over several generations, and the observable condition would only crop up should two carriers then be mated, but the abstentions from breeding indicated should reduce the incidence of the condition. Conversely, if cryptorchid dogs and their relations continue to breed, and particularly with close inbreeding, it would be expected that the incidence of affected and carrier animals would increase markedly.

The foregoing discussion will have shown clearly the insidious way in which a hereditary defect due to a simple recessive factor may become widely spread in a breed, and how if inbreeding is practised without stringent selection the results could be disastrous. Apart from causing sterility of the male dog when it is bilateral and complete, cryptorchidism may also affect the general health and disposition of the animal. Further, there is a tendency for the ectopic testis to become neoplastic; it may then cause an unpleasant feminizing effect, and may produce secondary growths. These side effects may cause distress to the animal and to its owner.

University News

The University of Liverpool

A very successful party, attended by members of the Veterinary School with their wives and other veterinary friends of the Faculty, was held at the Veterinary Field Station, Leahurst, on Saturday, June 4th, 1955, to make presentations to two members of the staff who would be leaving the University at the end of the session. These members are Professor Glover, who leaves to take up an appointment as Dean and Principal of the Royal Veterinary College, London, and Mr. C. W. Elam, who retires after more than 40 years as a part-time lecturer in the School.

In wishing God-speed to their colleagues and their ladies, many of those present made appreciative references to their past services to the School. Both recipients had selected radios, and it was mentioned that whilst Professor Glover appeared to prefer to go to his set when he listened in, Mr. Elam chose to take his about with him!

The Dean (Professor J. G. Wright) and Mrs. Wright were present, and also Professor and Mrs. E. G. White, Dr. and Mrs. G. O. Davies, Mr. and Mrs. H. V. Hughes, Mr. and Mrs. J. O. L. King, Mr. and Mrs. A. C. Shuttleworth, Mr. and Mrs. E. R. Callender, Mr. and Mrs. H. Sumner, Mr. L. Arnall, Dr. and Mrs. A. Buxton, Dr. and Mrs. M. E. Castle, Mr. and Mrs. R. B. Griffiths, Mr. and Mrs. H. P. Harding, Mr. W. E. Lawrence, Mr. P. A. Neal, Dr. J. Y. F. Paterson, Mr. H. E. Ritchie, Mr. and Mrs. A. G. Singleton and Miss N. Wickham.

Apologies for absence were received from Mr. and Mrs. R. Isherwood, Mr. and Mrs. N. H. Brooksbank, Mr. and Mrs. J. W. Dransfield, Miss A. P. Hirch, Dr. and Mrs. F. T. W. Jordan, Mr. and Mrs. R. B. Maneely, Mr. and Mrs. J. M. Olivant, Mr. L. N. Owen and Mr. and Mrs. P. J. N. Pinsent.

Queen's University, Belfast

Professor H. G. Lamont, O.B.E., D.SC., M.R.C.V.S., has been elected President of the Agrarian Society of Northern Ireland, Faculty of Agriculture, Queen's University, Belfast.

Dublin

The Veterinary College of Ireland will use the former stud farm at Chantilly, Co. Dublin, as a field station in connection with the College. Until 1950 the farm had been used by the Department of Agriculture as a quarantine station for imported animals, but this work will now be carried on at the Grange, Dunsany, Co. Meath.

The number of veterinary students has been increasing in recent years and, as Irish veterinary surgeons are entitled to be registered in Britain under the reciprocal agreement with the Royal College of Veterinary Surgeons in England, training on an identical basis is necessary. The Veterinary College at Ballsbridge is also being extended to provide better facilities for students. A library and a museum are being added.

President of the Royal College of Veterinary Surgeons, Mr. Henry Sumner

The election of a new President of the Royal College of Veterinary Surgeons must always be a matter of profound interest to the entire profession, for the veterinarian who is honoured by being raised to the highest office in his profession must clearly possess in himself high qualities of personality and achievement.

It has sometimes been suggested—though this is not the time or place to elaborate on the subject—that in the deliberations of the Council of the Royal College the views of practitioners attract less attention than could ideally be hoped. Be that as it may, such a criticism is silenced when the Council elects as its President one who, while too young to be called the doyen among practitioners, bears a name which goes back in the annals of practical veterinary surgery for nearly a century and a half.

Mr. Henry Sumner, the new President of the Royal College, is the fifth generation of his family to practise our art and science. There is evidence that the family practice was founded before the Battle of Waterloo, and a foundation stone bearing the date 1815 is in Mr. Sumner's possession. His father, as older veterinarians will recall, was a past President of the Royal College and of the National Veterinary Medical Association, as it then was. Mr. Sumner senior played an important part in the establishment of the Veterinary School within the University of Liverpool, and was an ardent advocate of University education as the preliminary of entrance into the profession.

The new President has been a member of the Board of Veterinary Studies of Liverpool University and was a member of the visiting parties from the Royal College to the Veterinary Schools of Glasgow and Bristol. Apart from that, however, his professional interests have been entirely in the sphere of practice. Those who know Mr. Sumner well will have heard him declare that his professional qualifications are modest and his academic attainments more modest still. But despite these protestations he has kept in touch with all the modern scientific advances which play such an important part in general practice today.

He was educated at Liverpool, qualified in July 1912 and took the Diploma of Veterinary Hygiene of the same University as his post-graduate course. His first experience in practice was as assistant to the late Sir Frederick Hobday, who was then in his hey-day. Two years previously he had introduced the operation for the treatment of roaring with which his name will always be connected, and so young Henry Sumner, as he then was, found himself in one of the most popular and prosperous practices in the country.

After some experience with Hobday he entered the family practice in Liverpool, changing over from largely small animal work to that among horses and farm stock. The first World War saw him as an Officer of the R.A.V.C. and during the period of hostilities he succeeded, to quote his own words, "in avoiding honours, promotion and courts-martial in that order of precedence." His experiences led him, to quote his own words again, "to develop an unfortunate allergy towards Colonels of the R.A.V.C.", though we are not informed whether that condition still persists in the new President!

After demobilisation Mr. Sumner rejoined the family practice and shortly afterwards married Miss Mabel Lax, the daughter of Mr. and Mrs. G. A. Lax of Newcastle upon Tyne. Of his three sons, Graham, the eldest, was lost in H.M. Submarine *Trooper* during the war, Rodney, who qualified in 1947, is in the family practice and Derek is farming in New Zealand.

Mr. Sumner and his partners foresaw the decline in equine practice with which much of their professional work had been associated over a period of years, and developed the agricultural side of their activities. This now fully occupies them, and in spite of his early experience in small animal practice Mr. Sumner is able to devote only a comparatively little time to it in these days. That is not to say, however, that he has not kept in close touch with small animal work and is not fully cognisant of, and sympathetic towards, the problems and difficulties of that side of the profession.

He has been a notable member of the B.V.A. for

many years, is a past President of the Lancashire Veterinary Association and recently received the distinction of Honorary Associateship.

His name is, however, particularly connected with the work of the National Veterinary Benevolent and Mutual Defence Society, and he was associated with the late John Holroyd, the late Frank Hopkin and Arthur Watson in the initiation of the more comprehensive scheme now in operation.

Mr. Sumner has been a member of the Council of the Royal College since 1940 with the exception of the year 1952/53 when he was unsuccessful in that year's election. He has served on a number of Sub-Committees and was at the time of his election to the Presidency, Vice Chairman of the Finance and General Purposes Committee and one of the six members of the Preliminary Investigation and Advisory Committee.

Over a period of years letters have been published in THE RECORD inviting candidates for election to the Council of the Royal College to state what they "stood for" professionally. There is no doubt what Mr. Sumner has stood for throughout his professional life—the highest prestige, dignity and ethical propriety of the Veterinary Surgeon. Himself descended, as has been said, from generations of veterinarians going back long before the days of the award of the Diploma, he sums up in his own person those fundamentals for which the great body of practitioners stand.

The Council of the Royal College has, we venture to say, been wise indeed to raise to the Presidential Chair this immensely experienced and highly esteemed son of a distinguished family.

News and Comment

VETERINARY SURGEONS HONOURED

In the Queen's Birthday Honours List, published on June 9th, we note with much pleasure that Mr. J. N. Ritchie, B.SC., M.R.C.V.S., D.V.S.M., has been made a Companion of the Bath. Mr. Ritchie was appointed Chief Veterinary Officer of the Animal Health Division, Ministry of Agriculture, in March, 1952, and since then has been responsible for co-ordinating the work of the whole-time and part-time employees of the Ministry to meet the needs of the country as a whole.

Mr. L. E. A. Rowson, M.R.C.V.S., Deputy Director of the Unit of Reproductive Physiology and Biochemistry at Cambridge, has received the Order of the British Empire. As many of our readers will know, Mr. Rowson is particularly interested in the subject of fertility and artificial insemination, and has made a valuable contribution to recent developments in this field.

HOLIDAY EXCHANGE

A member of the Swedish Veterinary Association would very much like his son, aged 16 years, to spend a month in England as a paying guest, preferably with a veterinary surgeon's family. If any member is interested, would he kindly write direct to the veterinary surgeon concerned:—

Distr. Vet. Folke Nilsson,
Klagstorp,
SWEDEN.

Please also notify the General Secretary, B.V.A., if you write to the above address, so that this notice may be discontinued.

MINISTRY OF AGRICULTURE, VETERINARY FIELD STAFF CHANGES

Mr. W. D. Macrae, M.R.C.V.S., D.V.S.M., has been transferred from Head Office, Tolworth, to Edinburgh, as Superintending Veterinary Officer in charge of Area 22.

Mr. J. A. Grisedale, M.R.C.V.S., Veterinary Officer at Chester, has been transferred to Haverfordwest, and Mr. E. J. Ruane, M.R.C.V.S., Veterinary Officer at Llandrindod Wells has resigned.

Mr. F. W. Aston, M.R.C.V.S.., D.V.S.M., Veterinary Officer, has been regraded as Assistant Veterinary Investigation Officer and remains at Veterinary Laboratory, Weybridge, while Mr. B. S. Hanson, M.R.C.V.S., Veterinary Officer at Haverfordwest, has been regraded as a Research Officer and is now stationed at the Veterinary Laboratory, Weybridge.

The following have been appointed to the permanent staff as Veterinary Officers:—

Mr. D. Basinger, M.R.C.V.S., will be stationed at Leeds. Mr. D. R. P. Buckner, M.R.C.V.S., will be stationed at Winchester.

PERSONAL

Engagement

CROWLEY—MORRIS.—The engagement is announced between Anthony James Crowley, B.V.SC., M.R.C.V.S., only son of Mr. & Mrs. M. Crowley, 82, Ashburnham Road, Northampton, and Janet Elizabeth Morris, elder daughter of Mr. E. G. Morris, M.R.C.V.S., and Mrs. Morris, 37, Park Avenue North, Northampton.

R.C.V.S. OBITUARY

LEWIS, Emyr Owain, of Tremarfon, Llanfairpwll, Anglesey. Graduated Liverpool, December 11th, 1952. Died June 7th, 1955, aged 29 years.

DEATH OF EMYR OWAIN LEWIS

Mr. Emyr Owain Lewis was a student at Liverpool University and only qualified M.R.C.V.S. in December, 1952. His death at the tragically early age of 29 was preceded by a long and painful illness, and his passing will be deeply regretted by all who knew him.

The funeral took place on Friday, June 10th, and he was buried at Llanfairpwll churchyard. "No flowers" were requested, but gifts were received in aid of the Cancer Research Fund.

He leaves behind him his widow, Dr. Margaret Lewis, and his two children, Jane and Emyr, to whom we extend our deepest sympathy.

R.C.V.S. EXAMINATIONS

June 23rd, Thursday.—M.R.C.V.S. Written Examinations.

June 24th, Friday.—M.R.C.V.S. Written Examinations.

June 27th, Monday.—M.R.C.V.S., Practical and Orals commence (Panels "A" and "B").

B.V.A. COUNCIL AND COMMITTEE MEETINGS IN LONDON

Wednesday, July 6th.—

10.30 a.m. Home Appointments Committee, at 7, Mansfield Street, W.1.

12 noon Parliamentary and Public Relations Committee, at 7, Mansfield Street, W.1.

2.00 p.m. Organising Committee, at 7, Mansfield Street, W.1.

Thursday, July 7th.—

10.30 a.m. Veterinary State Medicine Committee, at 7, Mansfield Street, W.1.

2.30 p.m. General Purposes and Finance Committee, at 7, Mansfield Street, W.1.

Friday, July 8th.—

10.30 a.m. Council Meeting at the Connaught Rooms, Great Queen Street, Kingsway, W.C.2.

COMING EVENTS

June

22nd (Wed.). Meeting of the Supplementary Veterinary Register Division, B.V.A., at 7, Mansfield Street, London, W.1, 2 p.m.

Summer Meeting of the Lancashire Division, B.V.A., at the Headquarters of I.C.(P) Ltd., Wilmslow, Cheshire, 2.45 p.m.

Annual General Meeting of the Southern Counties Division, B.V.A., at the Potters Heron Hotel, Ampfield, Nr. Winchester, 4 p.m.

Meeting of the Overseas Committee, B.V.A., at 7, Mansfield Street, Portland Place, W.1., 11 a.m.

23rd (Thurs.). Meeting of the Technical Development Committee, B.V.A., at 7, Mansfield Street, W.1, 10.30 a.m.

24th (Fri.) Annual General Meeting of the Lincolnshire and District Division, B.V.A., at the George Hotel, Grantham, 2.15 p.m.

July

1st (Fri.). Ordinary General Meeting of the Society of Practising Veterinary Surgeons at the Dolwar Café, Carmarthen, 2.15 p.m.

Summer General Meeting of the North of Scotland Division, B.V.A., at the Veterinary Investigation Centre, Whitley Road, Longbenton, Newcastle upon Tyne, 12, 2.30 p.m.

6th (Wed.) Annual General Meeting of the A.V.T. and R.W.'s (Northern Region) at Harper Adams Agricultural College, Newport, Salop, 10.30 a.m.

20th (Wed.). Annual General Meeting of the Southern Region of the A.V.T. & R.W.'s at the Agricultural Research Council Field Station, Compton, Berks.

28th (Thurs.) President's Invitation Luncheon and General Meeting of the Midland Counties Division, B.V.A., at the Swan Hotel, Stafford, 12.30 p.m.

September

4th to 10th. 73rd Annual General Meeting and Congress of the British Veterinary Association at Belfast.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Cambs. Redgate House Farm, Bank End, Foul Anchor, Tydd St. Giles, Wisbech (June 3).

Derby. Broadfields Farm, Kilburn (June 3).

Durham. Hilton Grange Farm, Hilton, Gainford, Darlington (June 7).

Kirkcudbright. Borness, Borgue (June 3).

Leics. Dairy Farm, John O' Gaunts, Melton Mowbray (June 10).

Northumberland. Swinhope Mill, Sparty Lea, Hexham (June 9).

Notts. Willey Wood Farm, Moordreen, Langley Mill (June 7).

Salop. Grafton House, Montford Bridge, Shrewsbury (June 7).

Warwicks. The Firs Farm, Haseley (June 6).

Yorks. White House Farm, Newton-on-Ouse; Town Farm, Ottringham, Hull (June 2); Buddle House, Whaston, Richmond (June 4); Breckenbrough Farm, Catterick (June 9); Tankerley Old Hall Farm, Hayland Common, Barnsley (June 11).

Fowl Pest

Essex. Mosklyns Farm, Purleigh, Chelmsford (June 6); Campion Farm, Broomfield and The Cottage, Purleigh, Chelmsford (June 8).

Lincs. Wrangle House, Wrangle, Boston (June 7).

Swine Fever

Ches. Bolshaw Farm, Bolshaw Road, Handforth, Wilmslow; Glebe Farm, Malpas; Manor Farm, Willington, Tarporley; Belle Vue Farm, Crewe Road, Wheelock, Sandbach (June 6); Yew Tree Farm, Broughton Lane, Wisterton, Crewe (June 7).

Cornwall. Tamar Park, North Pill, Saltash (June 11).

Derby. Piggeries adjacent to Newhall United Football Field, Newhall (June 6); Manor Syck Farm, Church Street, Old Whittington, Chesterfield (June 9); Plough Inn, Two Dales, Matlock (June 10).

Denbigh. Compton House Yard, Abergele (June 8).

Devon. Monkerton Farm, Pinhoe, Exeter (June 10); Hellwell Farm, Kenton, Exeter; Higher Venn Farm, Teignmouth (June 13).

Essex. Broomfields Farm, Boxted, Colchester (June 6); Olders Piggeries, Thorpe Bay Brickfields,

Barnstaple Road, Thorpe Bay, Southend-on-Sea (June 8); Park Drive Piggeries, Braintree; Swallows Cross Farm, Doddinghurst, Brentwood (June 9).

Fife. Bankhead Farm, Auchtertool, Kirkaldy (June 4).

Herts. Fairshot Court, Woodcock Hill, Sandridge, St. Albans (June 10).

Lancs. New Lemon House Farm, Kellett Lane, Bamber Bridge, Preston; The Piggeries, "Katoomba," Bells Lane, Maghall, Liverpool; Piggeries, Britannia Street, Pendleton, Salford, 6; Wild Rose Cottage, Gorse Lane, Tarleton, Preston (June 8).

Lincs. Carr Side Farm, Epworth (June 11).

Norfolk. Whitehouse Farm, Kettlestone, Fakenham; Crown Farm, Newton St. Faith, Norwich (June 6).

Salop. Hall Farm, Westbury, Shrewsbury (June 10); West Farm, Underton, Bridgnorth (June 11); Tantree Bank, Rowley, Westbury (June 12).

Staffs. Oaklands Farm, Huntington, Cannock (June 6); Bungalow Farm, Green Lane, Great Barr; Hollow Mill Farm, Hinksford, Stourbridge (June 8).

Suffolk. Woodlands Farm, Weston, Beccles (June 8).

Sussex. Woodyard Farm, Small Dole, Upper Beeding, Steyning; Clay Lane Piggeries, Fishbourne, Chichester (June 8).

Warwicks. Newhouse Grange, Sheepy, Atherstone (June 7); Highfield Farm, Cardsworth, Birmingham (June 8); Pillory Green Farm, Pillory Green, Napton (June 9).

Worcs. Parke Farm, Overbury, Tewkesbury (June 8); The Laurels, Hopwood, Birmingham (June 14).

Yorks. Poplar Farm, Long Sandal, Doncaster (June 6); Home Farm, Welton, Brough (June 7); Worral Hall Farm, Worral; City General Hospital, Langley Hall Farm, Southey, Sheffield (June 11); Manor Cottage Farm, 449, Manor Lane, Sheffield, 2 (June 13).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

THE INFECTION OF CHICKENS *(GALLUS GALLUS)* WITH SUSPENSION OF THE BLACKHEAD ORGANISM *HISTOMONAS MELEAGRIDIS*

Sir,—Several methods have been employed for artificially infecting turkey poults and hen chickens with *Histomonas meleagridis*. Infected caecal and liver material and cultures of the protozoa have produced infections when injected *per os* or *per cloaca*. *Heterakis* ova, as reputed vehicles for the protozoa, are commonly used in their embryonated state to produce experimental blackhead in hen chicks and poults.

Williams Smith (1954), working with *Salmonella gallinarum*, found that different infection rates were obtained when the organisms were administered in different kinds of food which influenced the bactericidal action of the gastric juice. He concluded that at least two properties of foodstuffs appeared to influence the bactericidal mechanism, their capacity to neutralise gastric acidity and their consistency. When the *p*H of the gizzard was raised the bactericidal action was less marked and more organisms passed through into the duodenum.

It was thought that a mechanism similar to that described by Williams Smith might also operate in the case of blackhead infection. Failure has always attended our attempts to produce blackhead lesions in hen chicks having free access to a food of conventional formula at the time of injection *per os* of ground-up caecal material. The material was derived from the caeca of other chickens that had been infected with embryonated ova of *Heterakis*. When chickens were deprived of food for the 18 hours preceding injection of infected caecal suspensions a small proportion of them developed patent infections. The *p*H of the gizzard contents of feeding chickens varied from 2.9 to 3.3 while that of starved chicks rose to 6.3—7.0. When the *p*H of the gizzard contents was raised, *i.e.* to 7.3—7.6, by administering an alkali mixture to starved chickens patent infections were produced in most cases. When alkali was given to feeding chickens the *p*H of the gizzard contents rose to 6.2—6.5 and infections were produced in much the same proportion of cases as in starved chickens not receiving alkali.

The resistant *Heterakis* ovum provides protection to the protozoan during its passage through the acid environment of the gizzard of the feeding chicken, and infections are readily obtained by the administration of the embryonated ova of this nematode. The acidity of the gizzard of feeding chickens appears to provide a barrier to the passage of the unprotected protozoan into the intestine. Should this hypothesis prove to be true it seems unlikely that feeding birds become infected by ingesting freshly passed faeces from an infected bird; on the other hand, a small proportion of starved birds might become infected by doing so and similar birds by attacking and eviscerating a bird dying of blackhead, might occasionally become infected by the ingestion of infected caecal tissue.

The primary object of these experiments was to explore the possibilities of infecting hen chickens by suspensions of histomonads in the absence of culture media. It is now proposed to extend the investigation to turkey poults and to consider the effect on such infections of changes in the contents of the gizzard and upper intestine.

A full report of these observations on infecting hen chickens will be published elsewhere.

Yours faithfully,

C. HORTON-SMITH and P. L. LONG,

Poultry Research Station,
Animal Health Trust,
Houghton Grange,
Hunts.

May 20th, 1955.

Reference

SMITH, H. WILLIAMS. (1954). *Brit. J. exp. Path.* **35**. 447.